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ENERGETIC EFFECTS OF COOPERATIVE BREEDING ON BRAIN SIZE AND FERTILITY

K. Isler, C.P. van Schaik

University of Zürich, Zürich, Switzerland

Presenter's Email: kisler@aim.uzh.ch

Both offspring production and brains are a major load on the energy budget of animals. In mammals, immature brains are particularly large relative to body mass, and thus particularly costly to grow and maintain. In many species, non-mothers provide some help and thus energy subsidies during the breeding period, by either provisioning, carrying, huddling or protecting the offspring and the mother. In this large-scale comparative study (N=430 species of placental mammals), we tested whether energy subsidies during breeding facilitates the evolution of larger brains, and how development mode affects this correlation. In altricial mammals, energy subsidies are available during the period of brain growth of the offspring, which occurs mainly between birth and weaning. In this group, a significant positive correlation between the amount of help by non-mothers and relative brain size is found. In the precocial primates, however, a large percentage of brain growth is completed prenatally, and provisioning of mothers during gestation is very rare. Thus, as in other precocial mammals, the presence of energy subsidies during breeding entails no brain enlargement, but instead a more altricial state at birth and increased fertility, up to the extreme of cooperatively breeding callitrichids that produce twins at increased rates. Finally, we show how humans fit into the picture, as they combine cooperative breeding with relatively small brains as neonates and exceptionally large brains as adults.

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